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## PROVISIONAL SPECIFICATION

### Improvements relating to the Fuel Injectors of Compression Ignition Oil Engines

We, L. GARDNER & SONS LIMITED, a British Company, of Barton Hall Engine Works, Patricroft, Manchester, and JOSEPH HUGH STOTT GARDNER, a British Subject, of the Company's address, do hereby declare the nature of this invention to be as follows:—

This invention relates to the fuel injectors or sprayers of compression ignition oil engines. An injector usually comprises a body part, a nozzle, a screwed cap by which the nozzle can be clamped upon the end of the body part so as to make a fluid tight joint therewith, and a valve which seats in the nozzle. The latter is usually made of hardened steel to provide a good seating for the valve. In practice it is found that under heavy load conditions and at high speeds, the injector nozzle may become overheated and this prejudicially affects the character of the fuel spray and the running of the engine.

The object of our present invention is to provide simple and effective means by which overheating of the injector nozzle

is minimised or obviated.

In accordance with our invention, the nozzle fitting is of composite construction being formed of a hardened steel or like inner portion or sleeve in which the valve seats and a bronze or other alloy of high heat conducting outer portion or sleeve, the two portions making good contact by being for example a press fit the one within the other. The inner sleeve or portion has a flange at its end which abuts against the injector body and the outer sleeve or portion is recessed to receive such flange and is itself flanged to receive the screwed cap by which the end faces of both portions are held in fluid tight engagement with the valve body.

The outer portion of the nozzle acts to conduct heat away readily from the inner portion to the injector body which is relatively cool so as to prevent overheating of the nozzle and the disadvantages following therefrom.

Dated this 12th day of December, 1933.

MARKS & CLERK.

## COMPLETE SPECIFICATION

### Improvements relating to the Fuel Injectors of Compression Ignition Oil Engines

We, L. GARDNER & SONS LIMITED, a British Company, of Barton Hall Engine Works, Patricroft, Manchester, and JOSEPH HUGH STOTT GARDNER, a British Subject, of the Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to the fuel injectors or sprayers of compression ignition oil engines. An injector usually comprises a body part, a nozzle, a screwed cap by which the nozzle can be clamped upon the end of the body part so as to make a fluid tight joint therewith, and a valve which seats in the nozzle. The latter is usually made of hardened steel to provide a good seating for the valve.

In practice it is found that under heavy load conditions and at high speeds, the injector nozzle may become overheated and this prejudicially affects the character of the fuel spray and the running of the engine.

The object of our present invention is to provide simple and effective means by which overheating of the injector nozzle is minimised or obviated.

In accordance with our invention, the nozzle fitting is of composite construction being formed of a hardened steel or like inner portion or sleeve in which the valve seats and an outer portion or sleeve of copper, bronze or other alloy of higher thermal conductivity than the metal of the inner portion, the two portions making good contact one with the other by being for example a press fit the one

within the other. Preferably the inner sleeve or portion has a flange at its end which abuts against the injector body and the outer sleeve or portion is recessed to receive a screwed cap by which the end faces of both portions are held in fluid tight engagement with the injector body.

The outer portion of the nozzle acts to conduct heat away readily from the inner portion to the injector body which is relatively cool so as to prevent overheating of the nozzle and the disadvantages following therefrom.

The accompanying drawing depicts one constructional form of an injector in accordance with our invention, the drawing being a longitudinal cross-section through the lower portion of the injector and the adjacent part of the cylinder head.

The injector valve *a* of hardened steel seats in a sleeve *b*, also of hardened steel. This sleeve *b* is surrounded by an outer sleeve *c* which in the present case is formed of bronze. The two sleeves are a press fit together and make good contact over the whole of their meeting surfaces so that the bronze sleeve *c* readily conducts heat away from the steel sleeve *b*. The sleeves *b* and *c* are each flanged at their upper ends as shown at *b*<sup>1</sup> and *c*<sup>1</sup> respectively.

Both sleeves are held with their flanges firmly pressed against the injector body *d* (which is of cast iron or steel and of comparatively great mass) by a flanged screw collar or cap *e*, threaded on to the body *d* and engaging the flange *c*<sup>1</sup>. The collar *e* is made of bronze and assists in conducting heat from the injector valve

seat up to the injector body *d*.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A fuel injector for a compression ignition oil engine having a nozzle fitting of composite construction, formed of a hardened steel or like inner portion or sleeve in which the valve seats and an outer portion or sleeve of copper or of bronze or other alloy of higher thermal conductivity than the metal of the inner portion, the two portions making good contact with one another by being for example a press fit the one within the other, for the purpose described.

2. A fuel injector according to Claim 1, wherein the inner sleeve or portion has a flange at its end which abuts against the injector body and the outer sleeve or portion is recessed to receive such flange and is itself flanged to receive a screwed cap by which the end faces of both portions are held in fluid tight engagement with the injector body.

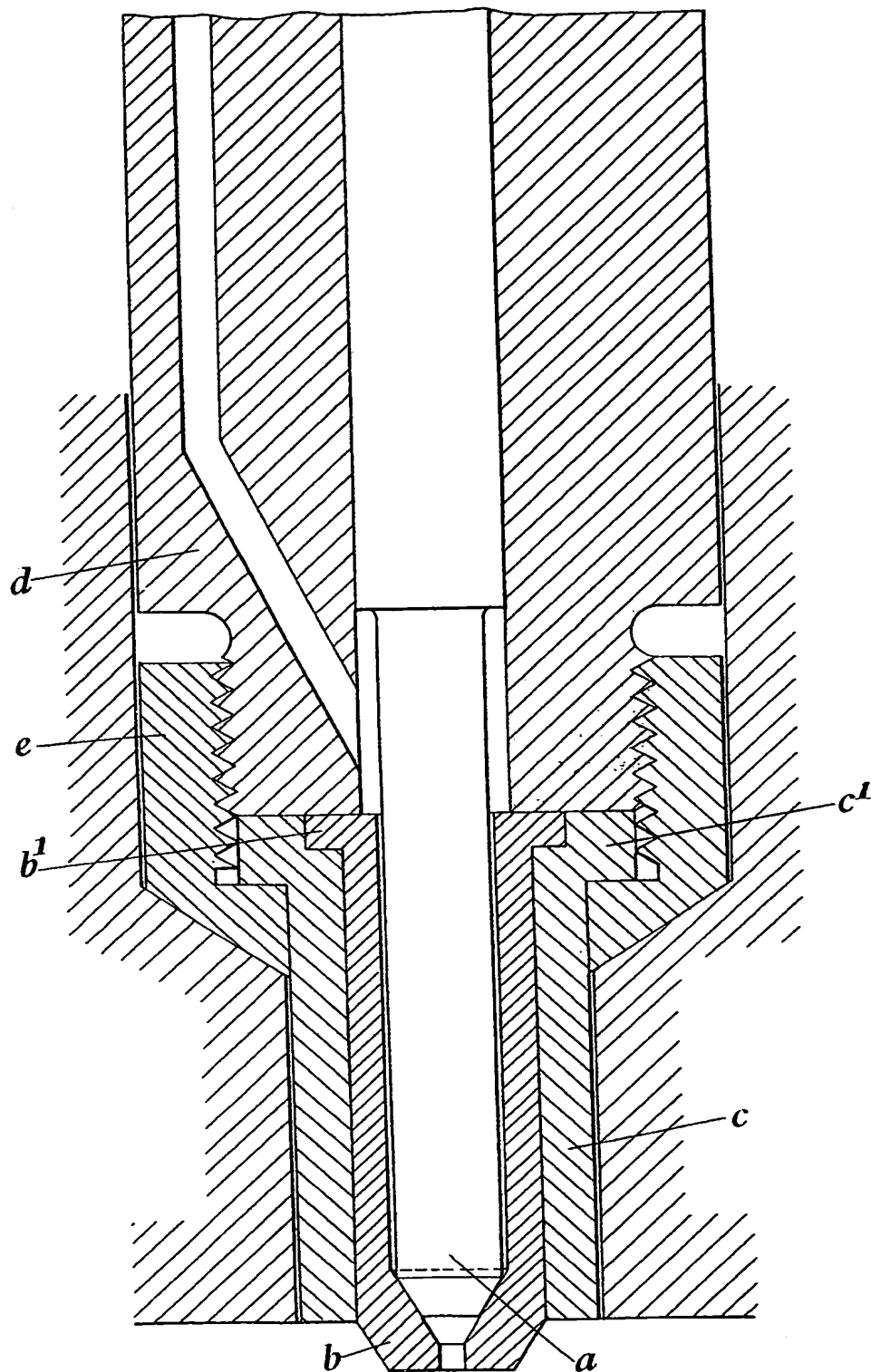
3. A fuel injector as claimed in Claim 1 or Claim 2 wherein the two sleeves are held in thermal contact with the body portion of the injector by a collar of metal of good thermal conductivity screw threaded upon the latter.

4. A fuel injector for a compression ignition engine substantially as hereinbefore described and as shown in the accompanying drawings.

Dated this 18th day of October, 1934.

MARKS & CLERK.

[This Drawing is a reproduction of the Original on a reduced scale.]



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